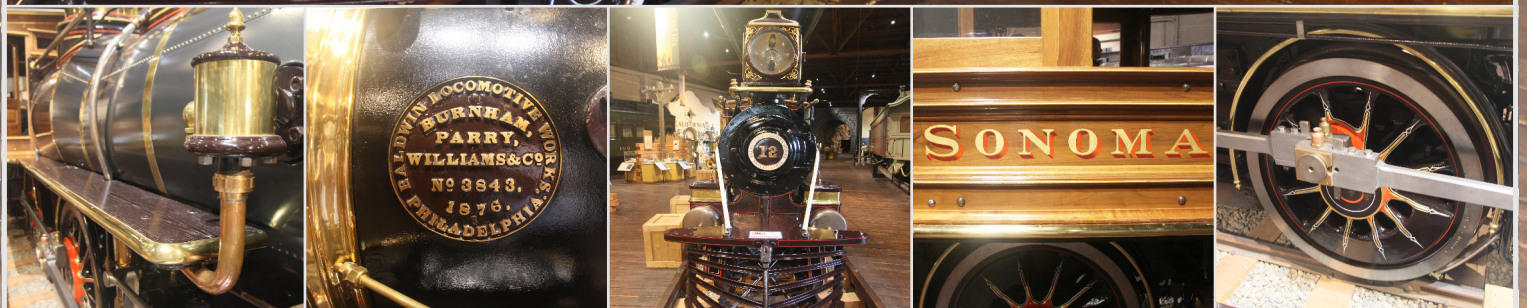


North Pacific Coast #12

SONOMA - STEAM LOCOMOTIVE



Research and
Restoration Report



THE NORTH PACIFIC COAST RAILROAD

LOCOMOTIVE #12

"SONOMA"

by

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Department of Parks and Recreation

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INDEX

	PAGE
Index	i
Preface	ii
Introduction	1
The Narrow Gauge Concept	2
The North Pacific Railroad	4
The Nevada Central Railway	6
The Locomotive, 1938-1979	8
Footnotes	19
Appendix A (Historical Summary)	22
Appendix B (Sources of Supply)	24
Locomotive Specifications	25
Map of the North Pacific Coast Railroad	26
Map of the Nevada Central Railroad	27
Bibliography.	28
Photographs	

PREFACE

This report is one of a continuing series of reports on equipment being restored by the California State Railroad Museum. This report on the Sonoma provides information of the concepts of the narrow gauge railroad, a history and description of the North Pacific Coast Railroad and the Nevada Central Railroad, the lines on which the "Sonoma" ran. We have provided the history of the locomotive developed after extensive research and the concept behind the restoration of the locomotive to its original appearance.

In short, this report, in addition to delineating the history of the railroads and the locomotive, tells what we did, why we did it, how we did it, and problems and solutions that came up along the way.

For obvious reasons the vast amount of research material and photographs (over 3-1/2 lineal feet) cannot be included with this report. This information remains in the archives of the California State Railroad Museum.

THE NORTH PACIFIC COAST

LOCOMOTIVE "SONOMA"

INTRODUCTION

The California State Railroad Museum, a project of the California Department of Parks and Recreation, is being developed to promote an awareness and sensitivity of the role of the railroad in California's history. The centerpiece of this ambitious project will be the Museum of Railroad History now under construction as part of the Old Sacramento State Historic Park complex. Here will be displayed a large and valuable collection of 19th and 20th century locomotives and rolling stock representing a meaningful cross-section of the trains which served the Western United States.

Among the goals of this project is the faithful representation of this equipment contextually and historically. Each piece has undergone close historical scrutiny in order that a high standard might be established in the field of railroad restoration.

The museum's program will include a complete 1870's era narrow-gauge passenger train displayed in an historical setting with supplementary exhibitry delineating the role of the narrow-gauge railroad in California.

Leading this narrow-gauge train will be Baldwin Locomotive No. 3843, one of three locomotives built in late 1876 for the three-foot gauge North Pacific Coast Railroad.¹ This engine is the subject of the following dissertation.

This paper will trace the history of the locomotive from 1876, when it was ordered, until 1979 when this research was completed. This discussion will include a treatment of the engine's service history as well as a description of the restorative processes it subsequently underwent.

THE NARROW GAUGE CONCEPT

Gauge, the distance between the rails, varied greatly among 19th century American railroads. The Erie Railroad originally was constructed with a six-foot gauge, while a five-foot gauge was "standard" in the South until 1886.²

In July 1863, the 37th Congress of the United States enacted the Pacific Railroad Act which required, among other things, that all track contributory to the transcontinental railroad be of uniform width. The gauge selected in March of the following year was the English standard of four feet eight and one-half inches.³ The increased governmental encouragement of standard gauge construction prompted the widespread acceptance of this gauge by American railroaders.⁴

In 1868, a locomotive of three and one-half feet gauge was constructed by the Baldwin Locomotive Works for the Averill Coal and Oil Company of West Virginia. This was the first narrow-gauge locomotive constructed by the Works.⁵

The three-foot gauge railroad assumed importance with the construction of the Denver and Rio Grande Railway of Colorado, the line's first locomotives having been designed and built by Baldwin in 1871.⁶

Early engines of this gauge were six-wheel, four-coupled (2-4-0) with forty-inch drivers. These engines proved too light and unsteady and were soon replaced by eight-wheel, four-coupled (4-4-0) locomotives.⁷ American Standard locomotives or 4-4-0's already enjoyed much success as evidenced by their widespread use on larger gauge railroads and by letters, written by railroad operators, extolling their virtues.⁸

The development of the lighter and less costly narrow-gauge equipment and the reduced cost of narrow-gauge railroad construction greatly influenced the course taken by railroaders of the 1870's. Despite the depressed economy of the period, pressure for railway system expansion persisted, promoting the proliferation of numerous narrow-gauge railroads in the Western United States. Moreover, the increased cost-effectiveness of narrow-gauge construction was further enhanced by the operational efficiency of narrow-gauge locomotives in mountainous regions at speeds impracticable by larger engines.⁹

The popularity of the narrow-gauge alternative is evidenced by the increased narrow-gauge locomotive production at the Baldwin Works. For the period 1874-1878, production of narrow-gauge locomotives for the first time represented over 25% of the firm's total locomotive production. In all, four hundred and ninety-four narrow-gauge locomotives were built, by Baldwin, between 1871 and 1879.¹⁰

It was during this narrow-gauge heyday that ten three-foot gauge locomotives were built by Baldwin for the North Pacific Coast Railroad, an eighty-mile line extending from Sausalito to Duncan's Mill, California.¹¹

THE NORTH PACIFIC COAST RAILROAD

The North Pacific Coast Railroad Company was formally incorporated on December 16, 1871.¹² The construction of the proposed line began in March of 1873.¹³

The hope of the railroad's earliest promoter and first president, Austin Moore, was to construct a new railroad traversing the rugged Marin County coastline and ultimately facilitating the exploitation of the area's redwood forests. To this end, Moore and his associates were awarded a county subsidy of \$160,000 in January, 1872. Legal problems delayed receipt of these funds until late in 1875.

By 1875, ownership of the small railroad had been transferred to Milton S. Latham, a San Francisco banker and former California governor, who had also acquired Moore's vast timber holdings south of the Russian River.

Operations began on the line in 1874 and construction to Duncan's Mill, the northern terminus, was completed in 1877. Through passenger service into Duncan's was inaugurated on July 15, 1877 over the eighty and one-half miles of track from San Francisco via San Quentin.

A combination of natural calamities, over-capitalization, and declining lumber prices culminating in a foreclosure suit against the line in December of 1880 led to the sale of the North Pacific Coast Railroad in August 1881 to a British syndicate. In the following twenty years, the financially troubled line experienced frequent changes in management; and finally, in 1902, the North Pacific Coast Railroad became the North Shore Railroad which was later acquired by the Northwestern Pacific Railroad. Over the years portions of the old North Pacific Coast were standard gauged. On December 10, 1928, the Northwestern Pacific petitioned the Interstate Commerce Commission to abandon the last remaining narrow-gauge portions of the railroad.

Of the ten Baldwin locomotives ordered between 1873 and 1877 by the North Pacific Coast Railroad, Baldwin No. 3843 remains the least well documented. Baldwin production records indicate that the locomotive was indeed built for the North Pacific Coast and was numbered N.P.C. No. 12, "SONOMA".

Unfortunately, only one newspaper account heralding the arrival of three engines for service on the line testifies, indirectly, to the delivery of this engine.¹⁴ The inconclusiveness of this evidence is compounded by the absence of photographic or documentary testimony of the engine's service on the North Pacific Coast Railroad.¹⁵

As was the case with eight other North Pacific Coast locomotives, No. 3843 was representative of Baldwin class 8-18C; eight-wheel "American" type wood-burning narrow-gauge locomotives with eight-wheel tenders capable of carrying one thousand gallons of water. The engine was constructed with 42" diameter driving wheels, has cylinders with 12" diameter bore and 16" stroke.

The boiler is a wagon-top design with a maximum working pressure of 130 P.S.I., jacketed with Russia Iron and bound with brass bands. The smokestack was a Radley and Hunter type.¹⁶

Presumably, the engine operated in both freight and passenger service on the North Pacific Coast Railroad. Although poorly documented during this period, it is known that by the end of 1879 the No. 12 had been sold. The reason for its sale remains unknown.¹⁷

On January 24, 1880, the newspaper, the Battle Mountain Messenger, of Battle Mountain, Nevada, reports the trial trip of a Nevada Central Railway locomotive recently purchased from the North Pacific Coast Railroad. This engine had "never been used but a few times on that (N.P.C.) road." This locomotive was Baldwin No. 3843 and was named the "General J. H. Ledlie", Nevada Central No. 5.¹⁸

THE NEVADA CENTRAL RAILWAY

In February, 1875, M. J. Farrell of the Manhattan Silver Mining Company proposed the construction of a railroad which would connect Austin, Nevada's second largest city, with the Central Pacific track in Battle Mountain. The Nevada Legislature authorized Lander County to grant \$200,000 of its bonds as a subsidy to encourage railroad construction.

Payment of the bond monies was to be awarded upon completion of the line and on March 25, 1878, the Nevada Railway was formally organized. The railroad company was reorganized in September, 1879 as the Nevada Central Railway.

The road was completed on February 9, 1880 and the bond money was awarded to the Nevada Central Railway.

Declining profits precipitated the sale of the Nevada Central to the Union Pacific Railroad which, by 1884, let the branch line slip into receivership.

On November 1, 1888, the bankrupt company was again reorganized, this time as the Nevada Central Railroad. This railroad remained in existence until December 20, 1937 when its abandonment was granted by the Interstate Commerce Commission.

* * *

Baldwin Engine No. 3843, the Nevada Central No. 5, performed mixed duty as a yard and construction engine and, apparently, underwent repair in the road's Battle Mountain shops. As originally built, hand operated brakes were installed only on the rear trucks of the tender. In 1881, brakes were applied to both sets of trucks. In 1902, automatic couplers and air brakes were installed on the engine and tender. The engine was out of service from November, 1909 to May, 1910, during which time the boiler was replaced and the engine truck was completely overhauled. The locomotive was again shopped, for six months, in 1913 when I.C.C. safety appliances were installed.¹⁹

Between 1905 and 1920, the period for which records are extant, the Nevada Central No. 5 was operated over 119,147 miles and was still listed in serviceable condition in the Nevada Central's inventory for abandonment.²⁰ The engine's value in August of that year (1937) was assessed at two thousand dollars.

Despite the sale of much Nevada Central equipment in January, 1938, the railroad's rolling stock remained in Battle Mountain through the summer of that year.²¹ Ownership of engine No. 5 was retained by J. M. Hiskey, the Nevada Central's last manager.

THE LOCOMOTIVE 1938-1979

In December 1938, Hiskey arranged the lease of the engine to A. C. Vollmann, a concessionaire with the Golden Gate International Exposition.²² The terms of the contract placed the engine in the trust of the Pacific Coast Chapter of the Railway and Locomotive Historical Society, whose members were charged with the maintenance and storage of the historic locomotive.²³ Ownership was to remain vested in Hiskey.

On December 15, 1938, the No. 5 was transported by rail, along with the Nevada Central's narrow-gauge Mogul No. 6, to the Southern Pacific Railroad shops in Oakland, California. There, both engines underwent extensive repair and were "restored to antique appearance."²⁴

On February 18, 1939, the engines began daily performances at the Exposition on Treasure Island, the No. 5 having been outfitted to resemble the Central

Pacific Locomotive "Jupiter" in a re-enactment of the completion of the first transcontinental railroad.

The Exposition program "Cavalcade of the Golden West" in which the engines performed was sufficiently successful to warrant their (engines') further inclusion in another program, "America! Cavalcade of a Nation", in May of 1940.²⁵ In October 1940, the engines completed their service on Treasure Island and were moved to the Southern Pacific shops in West Oakland, California for storage.

Between 1941 and 1977, the Nevada Central Locomotive No. 5 was stored and maintained in a number of facilities around the Bay Area in anticipation of the construction of a permanent museum facility for restoration and display.²⁶ On September 2, 1977, the locomotive arrived at the CSRM Restoration Shop facilities in the Southern Pacific yards at Sacramento for research and restoration.²⁷

Upon receiving the locomotive, the staff of the California State Railroad Museum assembled the available materials in order to establish a restoration program which would most accurately depict the artifact during one period of service. This objective was pursued in three ways. First, an attempt was made to process extant archival materials which discussed, described, or graphically portrayed the locomotive in service or under construction. Second, locomotive hardware was assessed with regard to its serviceability, condition, age, and intrinsic and/or historical value. Finally, the locomotive was studied with regard to its value as a museum artifact within the broader framework of the California State Railroad Museum program.

The search for documentary sources yielded an almost complete set of the locomotive's construction drawings. Also noteworthy was the discovery of the engine's mechanical service record on the Nevada Central Railroad.²⁸

Photographs of the engine in service on the Nevada Central as well as on Treasure Island were discovered, as were photographs of locomotives of the same class on the North Pacific Coast Railroad. Unfortunately, no photographs have been discovered, to date, which depict the engine as it appeared in service on the North Pacific Coast.

The abundance of information concerning the locomotive's construction, by Baldwin, and service on the Nevada Central Railroad, as well as the dearth of information concerning its North Pacific Coast years, made the exercise of only two, historically credible restoration options possible: either the engine could be restored to its appearance as built, by Baldwin, for the North Pacific Coast Railroad, or to its appearance at certain well-defined moments in service on the Nevada Central Railroad.

These options were then evaluated with regard to the goals and interpretive program of the museum. The narrow-gauge rolling stock collection of the museum was sufficiently extensive to make possible the assembly of an entire passenger train of the 1874-1881 period. The restoration to the as built appearance would graphically depict the role played by the narrow-gauge railroad in California. Such an exhibit would also highlight the engine's symbolic value as an example of narrow-gauge motive power. It was, therefore, decided that the Baldwin built American (4-4-0) could best be utilized leading such a train.

With these goals in mind, the curatorial staff of the museum developed a program which called for the engine's restoration to its 1876 appearance as built for a California railroad. In almost all cases, therefore, Baldwin construction drawings would be consulted in conforming the restoration of the engine to this interpretive program.

Guided by this program, the researchers and restoration workers began to reassess the existing hardware in order to determine what original equipment remained on the locomotive. Obvious additions such as air brakes and automatic couplers were removed. These components were, in most cases, compared with mechanical inspection reports, dated, and later accessioned into the museum's artifact collection. The tender was a replacement made by the Nevada Central. Not being of "Baldwin 1870s design", it could not be used in the restoration.

The age of much of the remaining equipment was not so easily determinable and required closer analysis. Baldwin structural specifications and finish details, from the De Golyer and Stanford University libraries, together with construction drawings served as our guides in dating these remaining components.

These documents provided details on the ornamentation of the engine, including paint color and layout, and specified the materials used by Baldwin in lagging and jacketing the locomotive. The cab of the locomotive was reported as having been constructed of walnut, finished with varnish and lettered "SONOMA".²⁹

The base paint color specified in this literature was "lake", a class of pigments prepared from lac, cochineal and kermes, commonly varying in color intensity from red to scarlet or burgundy.³⁰ The knowledge of the earliest paint color provided museum researchers with a readily identifiable key to establishing the originality of all painted metal components, while the knowledge of the cab finish made it possible to date the wooden cab components. Further, most all original components are stamped with the Baldwin engine class designation 8-18C-25, thus establishing the origin of their assembly. Other components were marked with different construction numbers, thereby indicating their status as replacements added to the engine in later periods of service.

Paint was then removed from the metal and wood components in accordance with the techniques described by M. W. Phillips and N. R. Weiss.³¹ The technique requires that a shallow scalpel cut be made through the existing paint layers, creating a crater. The sides of the crater are then sanded to a gradual slope, first with 220 grit wet/dry finishing paper and then with 600 grit paper. Light oil is applied to the crater surface throughout the process in order both to achieve a smooth surface and to minimize diffuse reflections of light at the polished surface. The cross sections produced in this way were then studied first under 10X magnification with a magnifying loop and then under greater magnification with a Bausch & Lomb binocular microscope (variable to 30x). The paint layers thus revealed were counted and compared with a number of standard paint color references.³²

The information generated in employing this technique was highly successful and large samples of the original lake paint were revealed under as many as

thirty distinct layers of paint, dirt, and varnish. The locomotive cab frame members proved to be original by the presence of the Baldwin class designation stamped on varnished walnut beneath twenty-seven layers of green, yellow, and black paint. The reinforcing hardware of the cab was determined to be lake in color as were the engine's wheels, headlight support-bracket, and cab support-brackets. These brackets also retained the yellow and white stripes installed by Baldwin in 1876.³³

Perhaps most noteworthy among the researchers' discoveries was that of the name "SONOMA" imbedded under approximately twenty layers of paint. Evidently, the early protection of cab by the application of paint over the varnish coupled with the oxidation of that paint's metallic salts effected a chemical reaction rendering the original lettering ineffaceable. The lettering was found on varnished walnut letterboards and conformed, stylistically, to that in contemporaneous use by Baldwin.³⁴

* * *

When restoration began, the engine bore the indentifiable scars of its sixty-three years of service. It was in many respects an amalgam of parts of varied age, some simply replacements of worn and discarded parts and others reflecting improvement in the technology of field. Certain components nonfunctional, vestigial or ornamental, having been mounted on the engine during its service at the Golden Gate International Exposition. Many of the wooden cab and running-board members showed signs of severe deterioration and the boiler was heavily corroded. Both cylinder castings were cracked at some

time during the engine's operational life. They had been repaired and sleeved with cylinder inserts. Rust had frozen the pistons in the cylinders.

The restoration of the locomotive began on an ad hoc basis in December, 1977, with the removal of the cab, jacketing, lagging, and air brake system. The firebox and truck frame were cleaned and the cylinder heads and pistons were removed. Later that month the pilot deck was removed and the engine's original parts were sorted for cleaning.

By the end of February, a new pilot was constructed following the original Baldwin drawings. Pilot braces were fabricated and the deck was riveted at the end of the month.³⁵ The engine's lead truck was disassembled, repaired

and reassembled under the engine and all welded brackets from the main frame were removed.

Between March and July, 1978, check valves were made, cylinder heads reinstalled, and boiler bands repaired. The tumbling shaft, links, eccentric straps and blades were also installed, and the rockers and guide yoke were burnished for later installation.

Beginning in July, progress on the engine accelerated with the assembly of the firebox door, cast in Sutter Creek, and the installation of the smoke box door. Most significant was the completion, during this period, of the Radley-Hunter-type smokestack. The stack components were fabricated of 16-gauge black iron and were assembled following Baldwin specifications. This stack, measuring 64-1/4" in height and 53-1/4" at its largest diameter, was

mounted on a base and installed on the engine the following month. Since that time, effort was concentrated on the fabrication and construction of the tender frame. The wooden frame components were milled and the 24" diameter wheel sets were located and purchased from the Leslie Salt Company in Amboy, California.

Much of the ornamental brasswork was manufactured in the intervening period between July and November, 1978, as were the fenders, draw bar, and oil can tray. It was also at this time that the boiler lagging of clear pine was applied.

At the time of this writing, restoration work on the engine was approximately 75% complete. The largest remaining task is the milling and assembly of the cab components and the application of the boiler jacket.

The researchers of the California State Railroad Museum devoted much time to the study of Russia Iron, the glossy blue gray coating of magnetic oxide produced in Russia in the late 19th and early 20th century. The process by which this surface was created required the hammering of charcoal between sheets of hot iron and created a highly corrosion-resistant surface, and much valued by early locomotive manufacturers. The color qualities of Russia Iron have been closely approximated by a few noteworthy museums using automotive paint, but the surfaces painted lack the hammered texture of the original substance. The manufacture of Russia Iron has long been discontinued and, as a consequence, the California State Railroad Museum staff has been evaluating alternative metal surface treatments including the use of paints, heat treating and/or powdered plastic coatings. After evaluation of all

possibilities, CSRM, as did the Smithsonian, made the decision to use automotive paint of a shade most resembling Russia Iron.

* * *

As of this writing (October 1978), \$73,585 had been spent on the restoration of this engine. Of this expense, approximate cost allocations were as follows: Engineering & Design - 9.4%; Research - 13.2%; Labor - 47.2%; Materials - 30.2%. Restoration of a locomotive on the scale described had rarely been attempted, and consequently the criteria upon which such projections might be made were scarce. A conscious attempt was made throughout the project to better define such criteria and to formalize in another publication a statement outlining certain aspects of the economics of railroad restoration. Such a product will be of great value to museologists, scholars and enthusiasts engaged in similar endeavors.

The most obvious benefit to be realized from these expenditures is the engine itself. The illustrations attached vividly testify to the remarkable quality and authenticity of the locomotive's restoration. As much as possible, the "SONOMA" appears now as it must have appeared in 1876 when built in Philadelphia.

In the process of its restoration, new research methodologies were developed as were new applications of conventional methods. Museum researchers, trained in conventional historical methods, alternately served as engineering analysts, archeologists, chemists and metallurgists. Restoration workers revived craft techniques long in disuse and were often compelled to abandon state-of-the-art

tools and instruments in favor of those current in the 1870's. In many cases, components were cast in a small foundry operated by water power and machined on a 19th century line shaft belt driven machine shop.

It is also hoped that these methods and techniques can, in the future, be formalized and made available to interested railroad historians and industrial archeologists.

Of more general value was the acquired understanding of 19th century industrial construction technique and materials. The detailed scrutiny of hardware and documentary and photographic resources has yielded a deep understanding of the dynamism of 19th century American industrial development generally, and of the railroad industry, particularly. This awareness is, of course, best developed with regard to the Baldwin Works.

Few details of the Works' practices were well understood when this restoration project began. As a result of their efforts in different directions, the museum research staff was compelled to gather data yielding very generally applicable information. Questions regarding the length of time required to build and deliver a locomotive can now be fruitfully studied as well as the corollary questions regarding labor productivity, and economies of scale in the railroad industry. New information has also been unearthed regarding the development of alternative shipping routes to the rapidly growing West.

This new information, when studied more closely and published, will improve our understanding of California history and of American industrial development. The restoration program has not been without flaws. The most

obvious problem was the absence of photographic and/or documentary evidence of the "SONOMA's" service history on the North Pacific Coast Railroad. This gap will certainly allow for a certain amount of scholarly skepticism regarding the myriad decisions determining the course of the engine's restoration. Fiscal limitations also make it impossible, at present, to undertake the research and development necessary to authentically reproduce Russia Iron. The absence of this distinctive material so characteristic of 19th century railroad construction, will be noted and may prove disappointing to a few. In the interest of retaining as much original equipment as possible, it was necessary to overlook weaknesses in the boiler and cracks in the cylinders. The restoration period chosen also precluded the retention of air-brakes and safety appliances added in later periods of service. These choices rendered the "SONOMA" inoperable, which may again be disappointing to a few.

Despite these shortcomings, the project is considered generally a great success. A new standard in railroad restoration has indeed been achieved, and subsidiary achievements will hopefully prove to be equally consequential. The California State Railroad Museum has begun restoration of another 1870's vintage Baldwin locomotive and its staff expects to benefit greatly from its experience with the "SONOMA". It is hoped that similar benefits will be realized by other institutions engaged in preserving this aspect of industrial culture and that the efforts of the CSRM staff will generate interest and further study in the history of the Western United States.

FOOTNOTES

¹Baldwin, or the Baldwin Locomotive Works, was founded in 1831 by M. W. Baldwin. The prominence of the firm in the field of locomotive construction has promoted the widespread use of the generic appellation "Baldwin" when referring to the company's activities at any time during its commercial existence. In fact, however, the firm underwent 16 changes in ownership status, most changes heralding a corresponding change in the firm's name. For the period 1870-1886, when the firm's 3,843rd locomotive was built, the company was officially recognized as Burnham, Perry, Williams & Company. The more widely recognized title "Baldwin" is used throughout to avoid possible confusion.

²A. Bray Dickinson, Narrow Gauge to the Redwoods, Trans-Anglo Books (revised edition, 1974), p. 19.

³George P. Sanger, ed., Statutes At Large of the United States of America, passed at the Second and Third Sessions of the Twenty-Seventh Congress, Ch. CXX (1863) and Ch. CXII (1864).

⁴There does exist sufficient evidence to support the thesis that notable railroaders lobbied vigorously for the establishment of the "standard" at 4'8-1/2".

⁵Baldwin Locomotive Works, Illustrated Catalogue of Locomotives (1881), Reproduction by Howell-North (1960), p. 45.

⁶Ibid.

⁷Ibid.

⁸Ibid., see letters on pp. 46 and 49; and Howard Fleming's Narrow Gauge Railways in America (1876), particularly pp. 8-20.

⁹Howard Fleming, Narrow Gauge Railways in America, 1st half (1876). A very influential work of the period.

¹⁰Baldwin Locomotive Works, op. cit., pp. 45-52. Locomotive production as follows:

1872	422	locomotives
1873	437	"
1874	205	"
1875	130	"
1876	232	"
1877	185	"
1878	292	"
1879	398	"
1880	515	"

Of these locomotives, between 1874 and 1878, 271 were of gauges smaller than the 4'8-1/2". $271/1044 = 0.26$ or 26%.

¹¹Dickinson, op. cit., pp. 25-38. Also see Paul De Ford, "A History of the North Pacific Coast Railroad from 1871 to 1877", a U.C. Berkeley seminar paper written in the 1940's.

FOOTNOTES (cont'd)

- ¹²See Articles of Incorporation, the North Pacific Coast Railroad, 1871.
- ¹³Much of the ensuing discussion was drawn from Dickinson, op. cit. and from two local newspapers, The Marin Journal and the San Rafael Weekly Herald.
- ¹⁴San Rafael Weekly Herald, November 2, 1876, "The N.P.C. RR have just received three new engines from the East..."
- ¹⁵The N.P.C. Locomotive No. 12 has been the subject of much controversy. Secondary sources are mixed in their analysis of the engine's construction and delivery dates. Baldwin records document the construction of the SONOMA and its "sister" engines in 1876, but no document verifies directly its arrival in California, or its subsequent service. Contemporaneous newspaper accounts testify to the N.P.C.'s ownership of nine locomotives at the end of 1875 (Marin Journal) and to the arrival of three engines in November of 1876. These figures compare favorably with those published by Poor's (June, 1877) and by the California Board of Commissioners of Transportation (1877).
- ¹⁶Baldwin Locomotive Works, Burnham, Williams & Co., Specification No. A-7680 (February 16, 1905) pp. 1-4.
- ¹⁷Battle Mountain Messenger, January 24, 1880.
- ¹⁸D. Myrick, The Railroads of Nevada, Vol. I, see chapter on the Nevada Central Railroad. Howell-North (1962).
- ¹⁹Master Mechanic's Inspection, the unpublished shop records of the Nevada Central Railroad. (April 1923.)
- ²⁰Nevada Central Railroad Inventory of Property for Abandonment. (August 14, 1937) p. 48.
- ²¹D. Myrick, op. cit., p. 74.
- ²²See the correspondence (unpublished) of Gilbert Kneiss with J. M. Hiskey.
- ²³See contract between J. M. Hiskey and Pacific Coast Chapter of the Railway and Locomotive Historical Society.
- ²⁴Letter from Gilbert Kneiss to J. M. Hiskey, January 2, 1939.
- ²⁵See photos from Golden Gate International Exposition.
- ²⁶Between June 30, 1940 and September 2, 1977, the locomotive was stored and maintained at five locations in the East Bay area as follows:

06/30/40-06/02/41	S. P. facility West Oakland, CA
06/02/41-07/07/50	Pacific Guano Co. yards Berkeley, CA
07/07/50-10/01/64	Moore Drydock Corp., Oakland, CA
10/01/64-09/02/77	Key System Inspection Bldg., Oakland, CA

FOOTNOTES (cont.'d)

- ²⁷The California State Railroad Museum represents a culmination of many years cooperation between the State of California and the Railway and Locomotive Historical Society. The Museum of Railroad History, in which the historic collection of rolling stock will be housed, should be completed in the spring of 1981.
- ²⁸Documents from the Nevada Central Railroad were provided by J. M. Hiskey, and consist of mechanical reports, inventories, letters, and other memorabilia collectively referred to as the Stokes papers. Construction diagrams of locomotives manufactured by Baldwin are found in the collections of the De Golyer Library, Southern Methodist University, Texas.
- ²⁹Baldwin Locomotive Works specifications for construction of narrow gauge engine of class 8-18C-25 for North Pacific Coast Railroad. (1876).
- ³⁰B. E. Miller, The Painting of Railway Equipment, (1924) Reprint by Simmons-Boardman, p. 17. Also, The Winston Dictionary (Collegiate Edition, 1946), p. 545, where lac is defined as: "a dark red, resinous substance deposited by a scale insect..."
- ³¹M. W. Phillips and N. R. Weiss, "Same notes on paint research and reproduction." Apt. Vol. VII No. 4 (1975), p. 15.
- ³²In this particular case, the Pantone standard reference system of paint color identification was employed.
- ³³See the Baldwin materials at the Stanford University Library. Among the holdings were found diagrams revealing both the striping patterns employed by Baldwin and the original colors applied to the engine.
- ³⁴The block-style lettering found was stylistically consistent with styles commonly utilized by Baldwin. The letter "S" in SONOMA was capitalized and the word SONOMA was punctuated with a period. This punctuation commonly followed proper nouns during the period of the engine's construction but fell into disuse later in the 19th century. The existence of this period strengthened the thesis that the lettering uncovered was indeed original.
- ³⁵See Appendix B. Work performed at the Restoration Shop was performed by employees of the California Department of Parks and Recreation.

APPENDIX A

Historical Summary

January 15, 1876	One of three 3' gauge 4-4-0's built for the North Pacific Coast Railroad by the Baldwin Locomotive Works. Baldwin class 8-18C-25, No. 3843 N.P.C. No. 12, "SONOMA".
November 2, 1876	Locomotive most likely delivered with N.P.C. engines No. 10, "BLOOMFIELD" and No. 11, "MARIN".
January 24, 1880	N.P.C. No. 12 sold and delivered to the Nevada Central Railway and renumbered Nevada Central No. 5, "GENERAL J. H. LEDLIE".
March 27, 1880	Nevada Central No. 5 reported performing service as yard and construction engine.
October 6, 1880	Engine overhauled and renamed "JOSEPH COLLETT".
October 28, 1881	Double truck brakes installed on tender.
December/January, 1881-2	Locomotive extensively repaired.
July, 1901	Firebox and boiler tubes replaced.
August 1901	Air and driver brakes installed.
September, 1901	Automatic couplers installed.
November, 1909- May, 1910	Locomotive out of service.
May, 1910	Boiler replaced (Baldwin Ext. Order #3173).
June 28, 1917	Alterations made to engine to ICC requirements.
April 12, 1923	Engine completely overhauled at a cost of \$2,387. Crown bars and bolts replaced.
January 31, 1938	Nevada Central corporate charter expires. Locomotive No. 5 stored at Battle Mountain.

APPENDIX A

Historical Summary (cont.)

December 9, 1938	J. M. Hiskey arranges lease of former Nevada Central Locomotive Nos. 5 and 6 to A.C. Vollmann of the Golden Gate International Exposition.
December 15, 1938	Nevada Central Locomotive Nos. 5 and 6 transported by rail to the Southern Pacific Railroad's shops, Oakland, CA.
January, 1938	Engines "overhauled and restored to antique appearance" in S. P. shops.
February 18, 1938	Engine No. 5 begins performance on Treasure Island, having been outfitted to resemble the Central Pacific Locomotive "JUPITER" for the spectacle "Cavalcade of the Golden West".
May 25, 1940	Engine begins performance in "America! Cavalcade of a Nation".
June 30, 1940	Locomotive maintained at S. P. facility in West Oakland, CA.
June 2, 1941	Engine moved to Pacific Guano Co. yards in Berkeley, CA.
July 7, 1950	Moved to Moore Drydock Corp., Oakland, CA.
October 1, 1964	Moved to Key System Inspection Building in Oakland, CA.
March 1, 1969	Railway and Locomotive Historical Society transfers its interest in the engine to the State of California for restoration and display in State Railroad Museum.
September 2, 1977	Engine arrives at Restoration Shop, Southern Pacific Railroad in Sacramento for restoration by staff of Railroad Museum Project.

APPENDIX B

LUMBER

Douglas Fir, Ash, Sugar Pine, Oak and Walnut from:
MacBeath Hardwood Company
2150 Oakdale Avenue
San Francisco, California

IRON CASTINGS

Castings of Gray Iron from:
Knight Foundry
P. O. Box 158
Sutter Creek, California

PAINT

Enamel paints from:
Fuller O'Brian Paint
16th and Q Street
Sacramento, California

TENDER TANK

Tender Tank components fabricated by:
Hickenbotham Brothers, Ltd.
536 South Aurora Street
Stockton, California

BUILDER'S PLATE

Locomotive Builder's Plates cast in brass by:
Berkeley Brass
Berkeley, California

Finished by:
Frank Saarni
Berkeley, California

GLASS

Antique Plate Glass form Stanford University
provided by:
Hugh Kennedy
Spencer and Associates, Architects

B.L.W. CONSTRUCTION DRAWINGS

Courtesy of Eric Thompson

STEAM LOCOMOTIVE SPECIFICATIONS

(Original Specifications)

Date: February 2, 1979By: KatzLocomotive: North Pacific Coast #12 (Sonoma)Builder: BaldwinBuilder Number: 3843Date Built: 1876Date Ordered: January 15, 1876Gauge: 3'Wheel Arrangement: 4-4-0 "American" Driver Dia: 42" Type Bearings: BrassPilot Wheel Dia: 24" Type Bearings: BrassTrailing Wheel Dia: none Type Bearings: --Type Brakes, engine: noneDriving Wheel Base: 7'6" Maximum Overall Wheel Base: 18' 17"Weight on Drivers: 27,000 lbs. Tractive Effort: --Total Weight, Engine & Tender: 42,000 lbs. Cylinder Size: 12"X16"Type Valve Gear: inside-Stephenson Type Valves: "D" Style slide typeMain Crankpin Size: 3 3/16" Dia. Others: 2 9/16" Dia.Main Rod Bearing Type: split-brass Side Rod Bearing Type: split brassBoiler Type: wagon top fire tube Boiler Builder Date: (reboilered Feb. 1905)Boiler Construction: 1/2" steel double rivet Superheater: --
Russia iron jacketNumber of Tubes: 112 Dia: 2 Length: 101 5/8" Tube Mat'l: steelFirebox Length: 59" Height: 51" Width: 22" Grate Area:
crown sheet 3/8" steelFuel: wood Type of Burner: noneNumber of Safety Valves: 2 Type: blw Last Date Set: -Pressure Settings: 130 psi Blowdown Valve Type: 1" cockNumber of Injectors: 1 Type, Left: - Right: Sellers #3Number Check Valves: 2 Type, Left: 1 blw Right: 2 blwFeedwater Pump: 2 brass crosshead Number of Water Sightglasses: 1
(1 each side)Type of Sightglasses: glass tube Other Water Equipment: -Throttle Type: balanced spool Location: steam domeNumber Lubricators: 2 Types: blw old styleLubricator Locations: both in cab (over)

STEAM LOCOMOTIVE SPECIFICATIONS

(2)

Number of Steam Gauges: 1 Types: _____
Number of Air Gauges: none Types: _____
(2) 1 steam gauge
Number of Cab Lights: 1 water gauge Types: oil
Number Headlights: 1 Type of Lights: oil blw
Number Back-up Lights: none Type of Lights: _____ Location: -
Whistle Type: Baldwin, single chime Location: steam dome
Bell Type: blw rope pull Bell Dia: 15" Height: 11 1/4" Location: top of boiler
between stack & sand
Communication/Signal Equipment: cab gone dome
Steam Heat Equipment Type: none

Identification Numbers/Markings on Locomotive: (use add'l sheet if req'd)
8-18c 25 on cab interior and driver axle ends

Tender Type: rectangular wood frame Tender Truck Type: arch bar wood bolster leaf
spring
Number of Truck Wheels: 8 Dia. of Wheels: 24" Type Wheels: solid
Type Wheels cont'd: --
Type Bearings: bronze/babbit Journal Sizes: 2 3/4 X 5
Journal Sizes cont'd: _____ Fuel Cap'y: 1 1/2 cord approx
Tender Weight Empty: 12,000 Loaded: - Water Cap'y: 1000
Tender Wheel Base: 136"

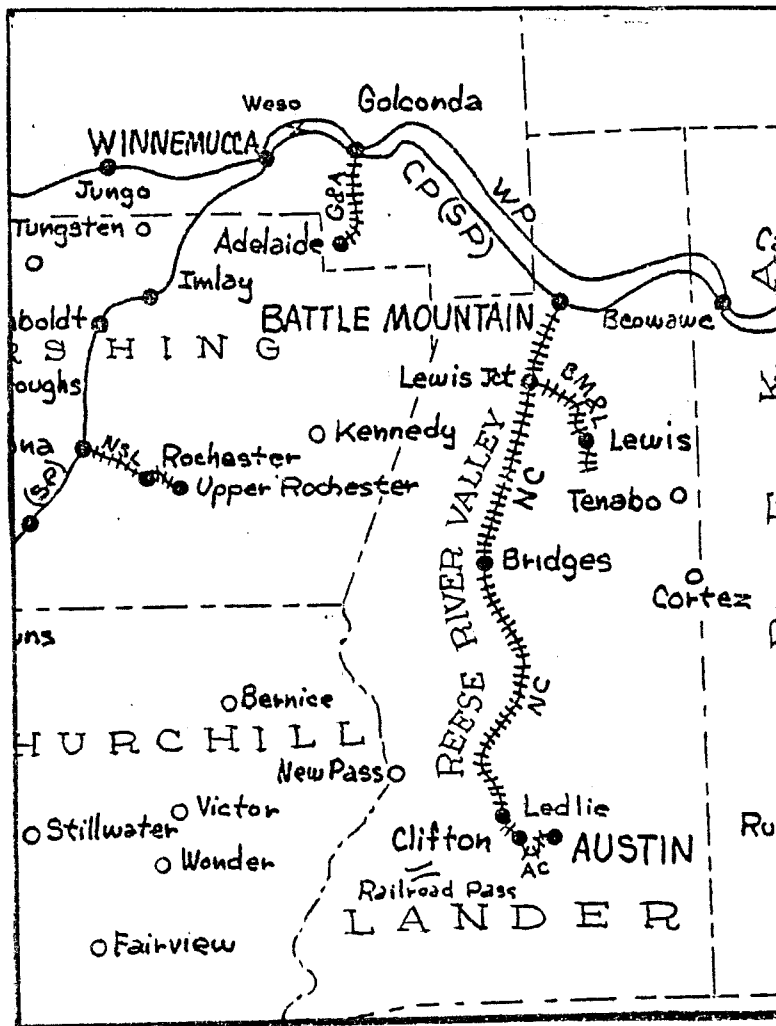
Identification Numbers/Markings on Tender: (use add'l sheet if req'd)
not original-replica constructed by California State Railroad Museum from Baldwin specs.

Obvious Patches/Modifications to Locomotive and/or Tender (other than R.R. Museum Restoration changes/modifications), Explain: (use add'l sheet if req'd) See CSRM Research Report and Central Shop Records and Company Annual Reports for modifications made 1879-1938. Front tube sheet patched, both cylinders cracked end-to-end. Pump-ears on crossheads removed by N.C.R.R., replaced by CSRM. First boiler course extended, firebox wrapper, right side patched for access, all I.C.C. req'd appliances removed at time of restoration.



Map showing the route of the
North Pacific Coast Railroad.
(c.1877)

(From Gilbert Kneiss, Redwood
Railways.)



Map showing the route of the Nevada Central Railroad. (From David F. Myrick, Railroads of Nevada and Eastern California Vol. 1.)

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Specifications for Construction of Narrow Gauge Engine of Class 8-18C for North Pacific Coast Railroad, Philadelphia, Baldwin Locomotive Works, Burnham, Williams & Co., 1876.

The Marin Journal, 1876.

ADDENDUM

The following information is taken from NPCRRCo. Cash Book 4, January 1879 - July 1881, page 380 (Cash In):

March 1, 1880

Account #17

To Cars and Equipment Suspense a/c RR Div

Rec'd from Robert S. Walker check dated
22^d January for one Locomotive & Tender
(N^o 12)

Amount of Check, \$ 7300.00

.

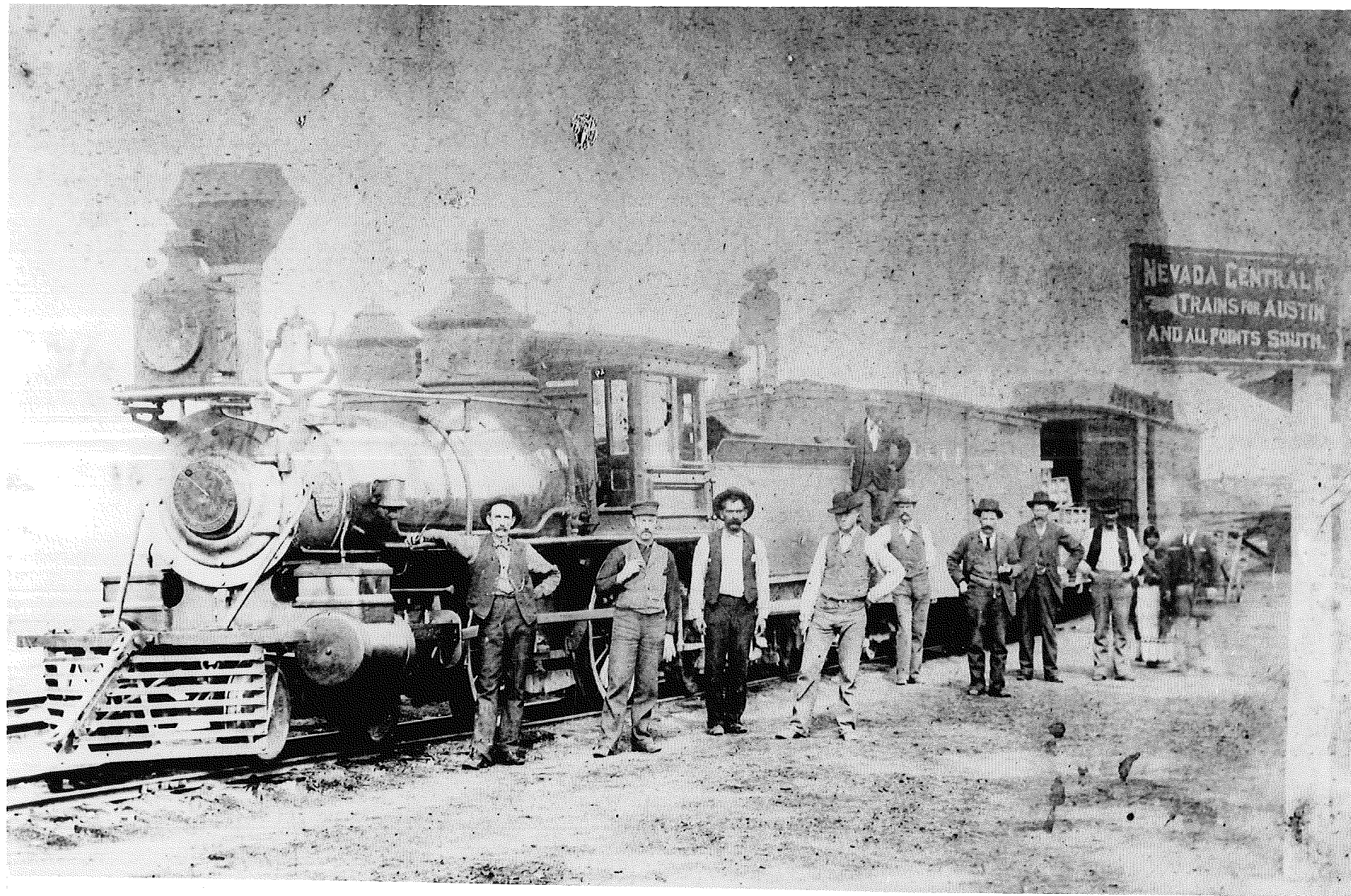
Robert S. Walker was vice-president of the Nevada Central in the 1880's.

This is the only direct reference to the Sonoma found in Cash Books 2-11, although Cash Book 3, January 1877 - December 1878, page 101 contains an entry for Voucher #2, Check #70, Account #482 on April 4, 1877 to Burnham, Parry, Williams and Co. for \$ 22,291.50 which may represent the purchase of three locomotives and tenders at \$ 7430.50 each -- the Bloomfield (#10), the Marin (#11), and the Sonoma (#12). The preceeding voucher to Burnham, Parry, Williams and Co. was dated March 4, 1876 in Cash Book 2 and probably was for the purchase of the M. S. Latham (#9).

Annie Grieshop
Historical Researcher
27 February 1980

NOTE: Holders of the original report on the Sonoma should attach this addendum to their copy and make the following note within the report on page 5, end of second paragraph, and page 20 following footnote #15: See Addendum.

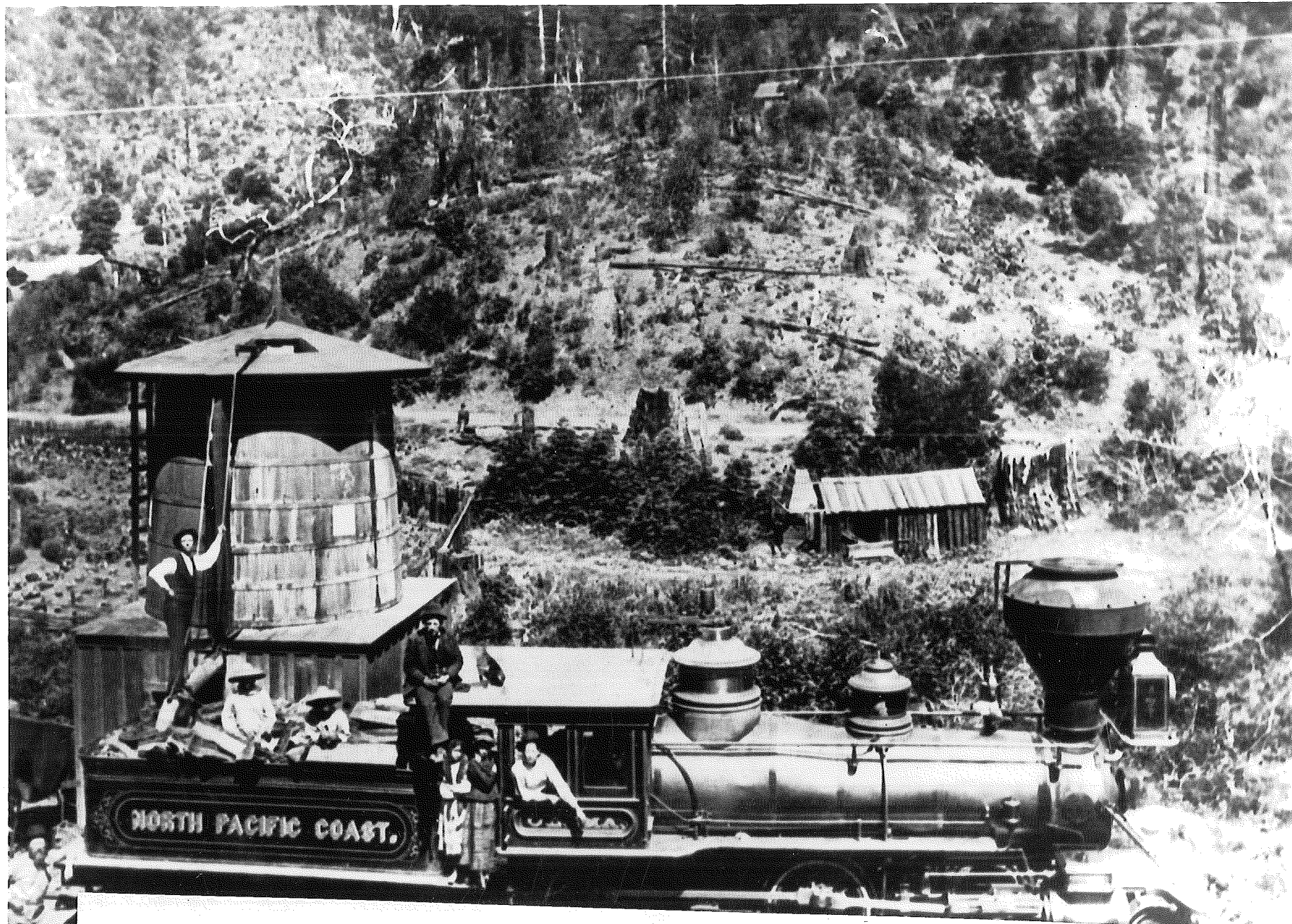
ADDENDUM



GILBERT H KNEISS COLLECTION

The North Pacific Coast Locomotive "Sonoma" (#12) as it appeared at
Battle Mountain Nevada while in operation as the Nevada Central #5 (ca. 1885).

GILBERT H KNEISS COLLECTION



North Pacific Coast Locomotive #4, the "Olema", a Baldwin 4-4-0

illustrating the paint scheme common to early engines of the N.P.C.

ROY GRAVES COLLECTION

RANCROFT LIBRARY



The "Sonoma" as the Nevada Central #5 at Battle Mountain Nevada in the 1930's.
A C PHELPS
COLLECTION



A C PHELPS COLLECTION

The "Sonoma", as the Nevada Central Railroad #5, being taken from that line
upon its abandonment in 1938. A C PHELPS COLLECTION



JAMES R JACKSON COLLECTION

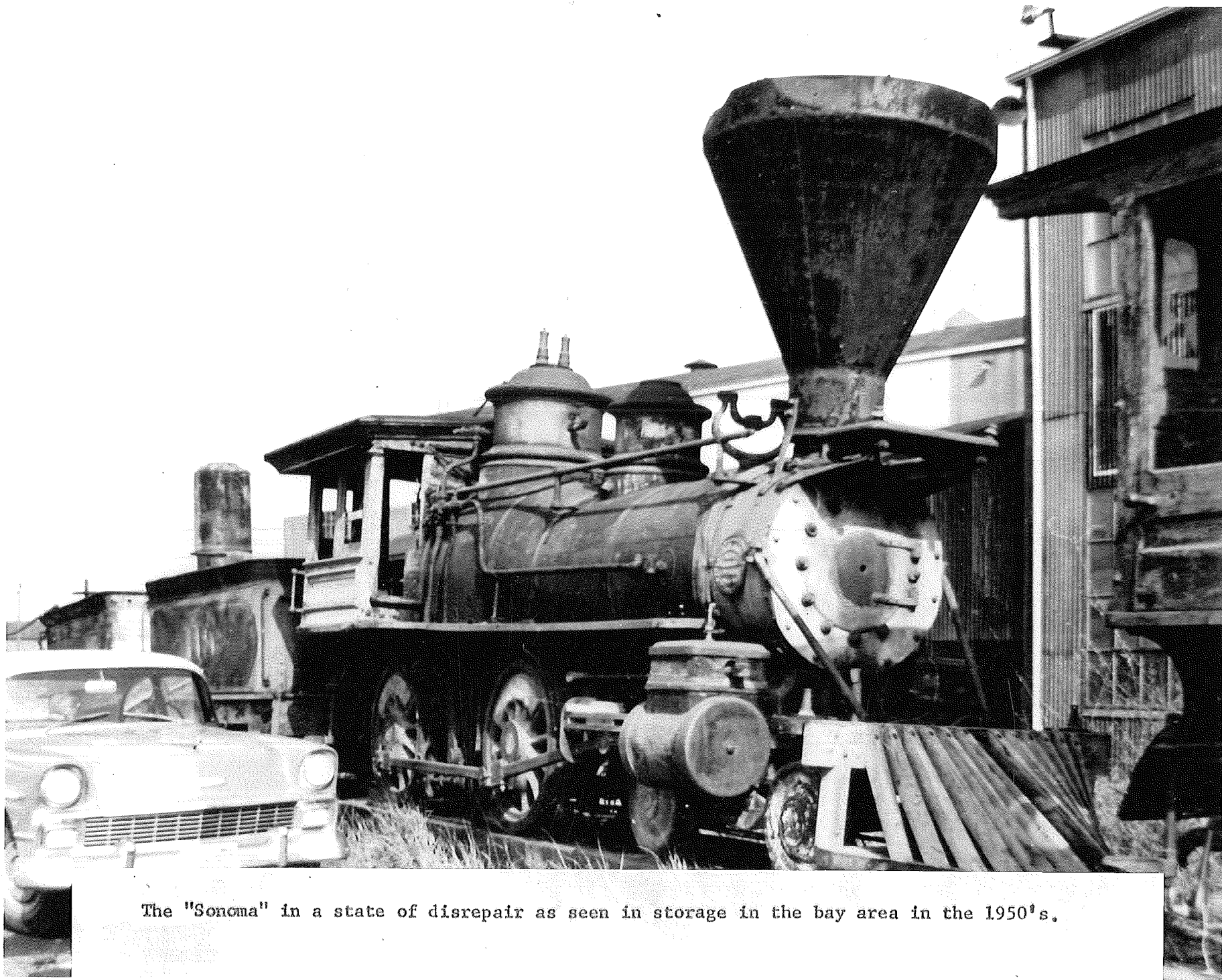
The "Sonoma" as it appeared "back stage" at the Golden Gate International Exposition in 1939 and 40. Locomotive was painted and modified to represent the Central Pacific's "Jupiter" during the Cavalcade of the West (1939) and the Cavalcade of the Nation (1940).

JAMES R JACKSON COLLECTION



The "Sonoma" as the "Jupiter" in 1939 and 40 at the Golden Gate International Exposition at Treasure Island in San Francisco Bay. The Locomotive is pulling the Nevada Central Railroad passenger coach Silver State, which was repainted to represent the Central Pacific car the Stanford.

BANCROFT LIBRARY

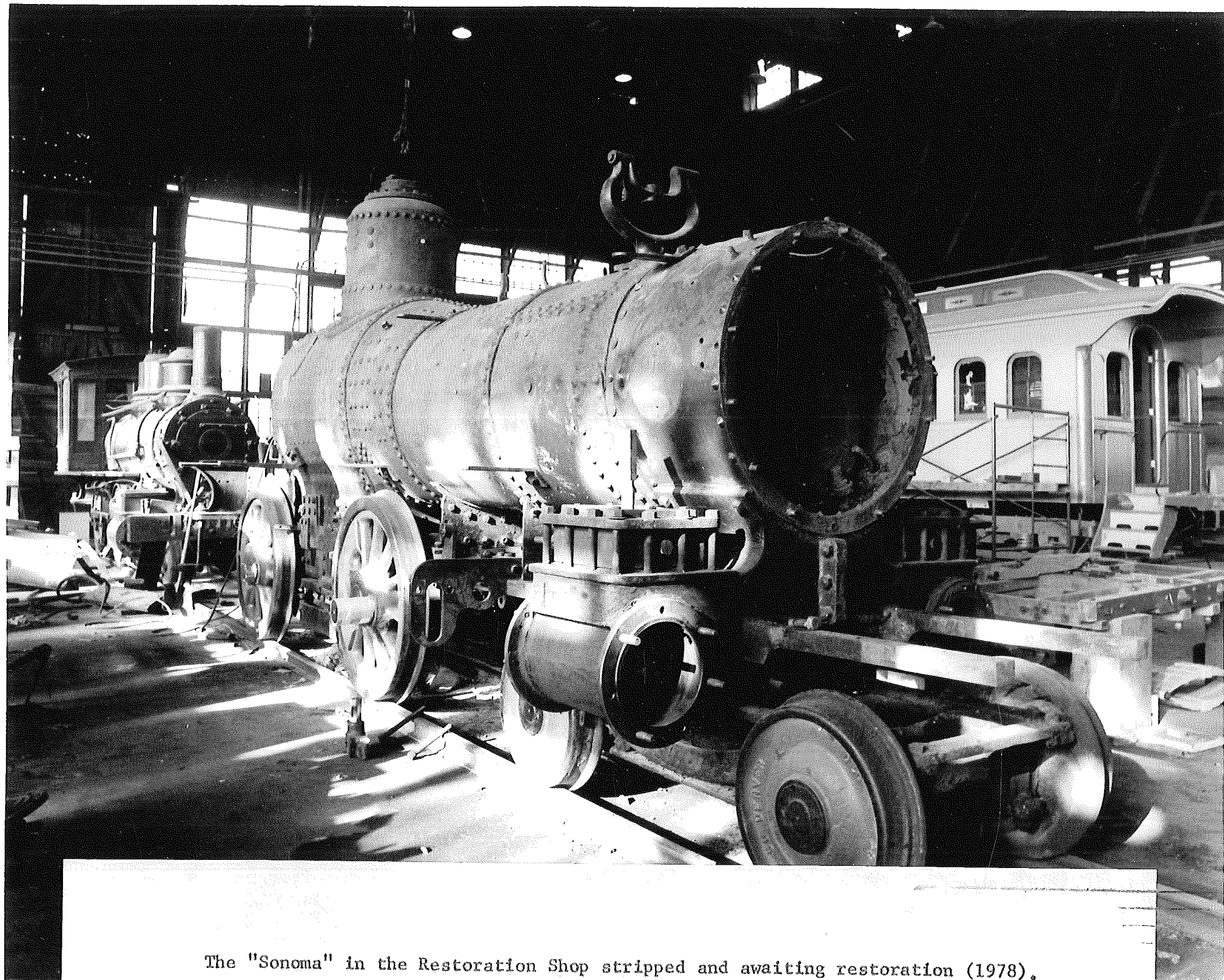


The "Sonoma" in a state of disrepair as seen in storage in the bay area in the 1950's.



8 The "Sonoma" arrives at the Restoration Shop of the California State Railroad Museum. CSRM PHOTO

The locomotive was trucked from storage at the Old Key Building at Oakland (Sep. 1977).



The "Sonoma" in the Restoration Shop stripped and awaiting restoration (1978).

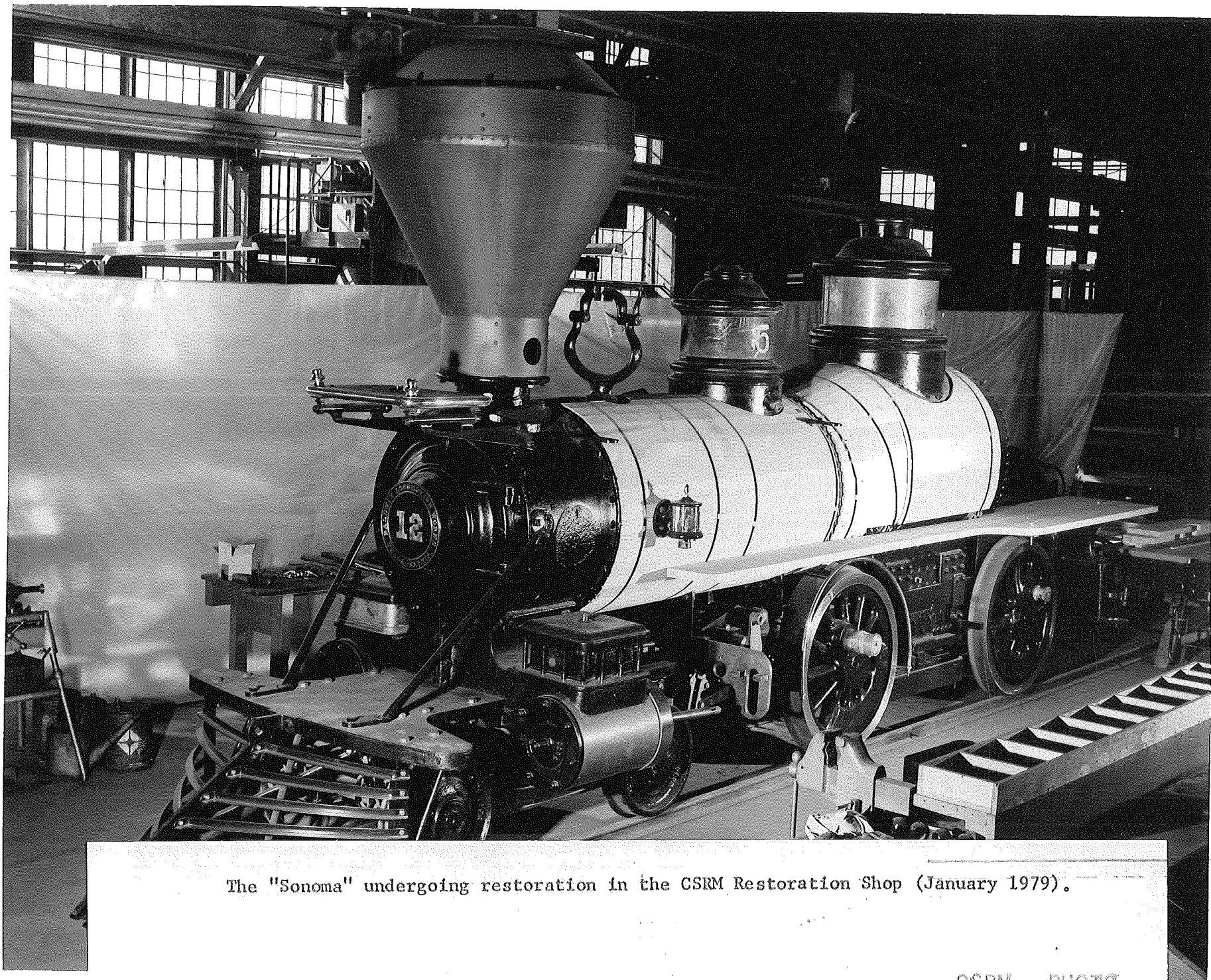


Original cab being removed from the "Sonoma".



Creating a replica of the Woodburning Radley-Hunter smoke stack for the "Sonoma".

CSRM PHOTO



The "Sonoma" undergoing restoration in the CSRM Restoration Shop (January 1979).



Creating a replica of the Woodburning Radley-Hunter smoke stack for the "Sonoma".

CSRM PHOTO